ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

Philips UniStreet gen2 Solar

VGP283/VGP293/VGP393
Signify N.V.

EPD HUB
Publishing date 2024-02-14

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Signify N.V.
Address	High Tech Campus 48, 5656 AE Eindhoven, The Netherlands
Contact details	sustainability@signify.com
Website	https://www.signify.com/global

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 and ISO 14025
PCR	EPD Hub Core PCR version 1.0, 1 Feb 2022
Sector	Electrical product
Category of EPD	Pre-verified EPD
Scope of the EPD	Cradle to gate with options, A4-B7, and modules C1-C4, D
EPD author	Sustainability Signify
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☑ Internal certification ☐External verification

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of lighting products may not be comparable if they do not comply with EN 15804 and if they are not compared in a lighting context.

PRODUCT

Product name	Philips UniStreet gen2 Solar Medium
Additional labels	VGP283 80 4S/730 48V III DM10 48/60S
Product reference	910925868307
Place of production	Poland
Period for data	2022
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	%

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 unit of 7120 lumens over 100000 hours
Declared unit mass	5.7 kg
GWP-fossil, A1-A3 (kgCO2e)	1.33E+02
GWP-total, A1-A3 (kgCO2e)	1.32E+02
Secondary material, inputs (%)	7.04
Secondary material, outputs (%)	66.2
Total energy use, A1-A3 (kWh)	388.0
Total water use, A1-A3 (m3e)	5.75E-01

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Signify is the world leader in lighting for professionals, consumers and lighting for the Internet of Things. Our energy efficient lighting products, systems and services enable our customers to enjoy a superior quality of light, and make people's lives safer and more comfortable, businesses more productive and cities more liveable.

For more information, please visit: https://www.signify.com/global

PRODUCT DESCRIPTION

Designed for large-scale projects, our luminaire is the ideal solution for municipalities who seek to meet their sustainability goals. Thanks to its energy efficiency and low initial cost, UniStreet gen2 Solar enables a fast payback and significant energy savings in a short period of time. All, by using the free, abundant solar power. UniStreet gen2 Solar, comes with several different optics and lumen packages customized to fit exact project requirements. Thanks to Service tag, you will enjoy the benefits of hassle free installation and maintenance while at the end of its lifetime our luminaire is ready to be dismantled and recycled. The compact luminaire, using high-quality materials is also easy to dismantle and recycle at the end of its lifetime

For more information, please visit
https://www.lighting.philips.com/link/VGP282/fam/aa/en

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	75.14	APAC , EU
Minerals	17.9	EU
Fossil materials	6.96	APAC , EU
Bio-based materials	0	Not applicable

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0.232

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 Product
Mass per declared unit	5.7 kg
Functional unit	1 unit of 7120 lumens over 100000 hours
Reference service life	100000 hours

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
x	x	x	x	x	MNR	MNR	MNR	MNR	MNR	x	MNR	MNR	x	x	x	x		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not relevant = MNR.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, electricity, and waste formed in the production processes at Signify's manufacturing facilities are included in this stage.

The product is made of metals, plastics, and electronic components. All components are transported to Signify's production facility, where the main manufacturing processes primarily are associated with assembly. The finished product is packaged with polyethylene, cardboard, and/or paper as packaging material before being sent to customers. Manufacturing loss, ancillaries and wastes are calculated according to the data that each manufacturing site is sharing with Signify. The total annual amount of waste in kg is allocated to the total annual production in kg at the specific manufacturing site responsible for the production of the studied luminaire. Thus, it is possible to allocate it according to the weight of the product analysed in this study. Some of the wastes are due to ancillary materials used during manufacturing while the rest is due to material losses.

TRANSPORT AND INSTALLATION (A4-A5)

Transport distances were calculated on the base of the supplier location and manufacturing location and then made a cumulative group choosing the conservative scenario. Environmental impacts from installation include waste packaging materials (A5). The impacts of energy consumption and the used ancillary materials during installation are considered negligible.

PRODUCT USE AND MAINTENANCE (B1-B7)

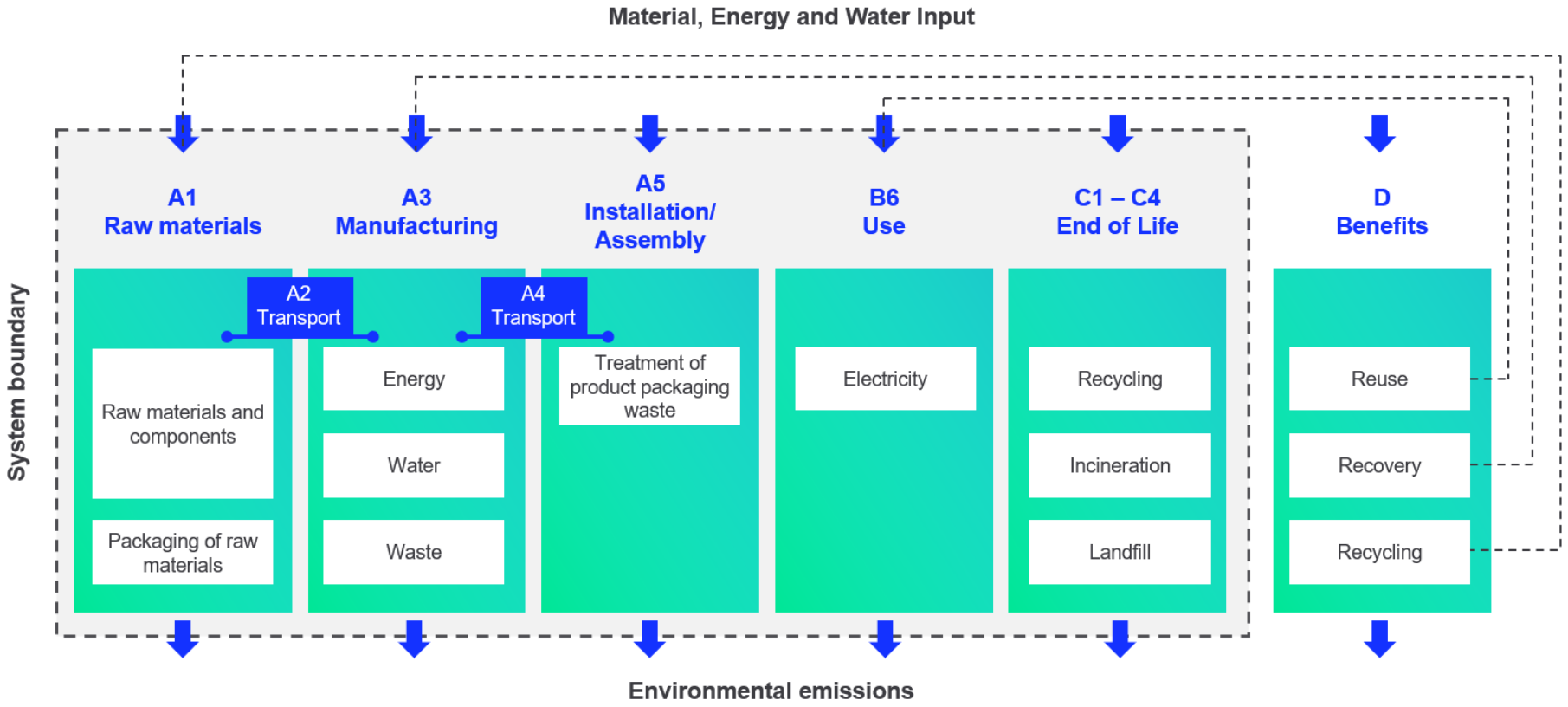
During the use phase, the product consumes electricity from Europe's electricity grid mix (B6). The total power consumption of the reference product is calculated as follows: Wattage x Reference lifetime = kWh consumed throughout the entire use phase B6.

PRODUCT END OF LIFE (C1-C4, D)

Consumption of energy and natural resources in demolition process is assumed to be negligible. It is assumed that the waste is collected separately and transported to the waste treatment centre. Transportation distance to treatment is assumed as 150 km and the transportation method is assumed to be lorry (C2). According to EN 50693:2019, the sequence of treatment operations occurring to the product shall include de-pollution, fractions separation and preparation (dismantling, crushing, shredding, sorting), recycling, other material recovery, energy recovery and disposal. In this study, the default values from table G.4 of EN 50693 is used for treating materials in different waste treatment methods. Due to the material and energy recovery potential of parts in the lighting system, the end-of-life product is converted into recycled raw materials, while the energy recovered from incineration displaces electricity and heat

production (D). The benefits and loads of incineration and recycling are included in Module D.

SYSTEM BOUNDARY



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, ancillary materials, energy & water consumption, material loss and waste generation at the manufacturing site are attributed to the bill of materials of the products, therefore, they are allocated by partitioning the quantities on the base of the total production in kg throughout the year. Thus, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging materials	No allocation
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

This EPD is created with a most conservative scenario in A1-A3 in terms of material composition.

AVERAGES AND VARIABILITY

Type of average	No averaging
Averaging method	Not applicable
Variation in GWP-fossil for A1-A3	Not applicable

This EPD is product and factory specific and does not contain average calculations. It is created with a most conservative scenario in A1-A3 in terms of material composition.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. EcoInvent 3.8 database was used as the source of environmental data.

ENVIRONMENTAL IMPACT DATA

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	1.31E+02	1.23E+00	-3.78E-02	1.32E+02	1.23E+00	8.59E-01	MNR	MNR	MNR	MNR	MNR	1.70E+03	MNR	MNR	8.61E-02	4.75E-01	4.39E-01	-6.00E+01
GWP – fossil	kg CO_2e	1.31E+02	1.23E+00	7.95E-01	1.33E+02	1.23E+00	2.26E-02	MNR	MNR	MNR	MNR	MNR	1.70E+03	MNR	MNR	8.61E-02	4.75E-01	4.39E-01	-6.00E+01
GWP – biogenic	kg CO_2e	-4.24E-01	0.00E+00	-8.37E-01	-1.26E+00	4.76E-04	8.37E-01	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	0.00E+00	0.00E+00	-6.52E-03
GWP – LULUC	kg CO_2e	1.87E-01	7.60E-04	3.76E-03	1.92E-01	4.54E-04	7.49E-06	MNR	MNR	MNR	MNR	MNR	3.97E+00	MNR	MNR	3.18E-05	1.31E-04	7.68E-05	-4.49E-03
Ozone depletion pot.	kg CFC_{-11}e	4.87E-06	2.57E-07	9.68E-08	5.23E-06	2.83E-07	2.20E-09	MNR	MNR	MNR	MNR	MNR	8.63E-05	MNR	MNR	1.98E-08	1.03E-08	7.50E-09	-1.62E-06
Acidification potential	mol H^+e	8.83E-01	2.92E-02	3.38E-03	9.16E-01	5.21E-03	1.72E-04	MNR	MNR	MNR	MNR	MNR	9.71E+00	MNR	MNR	3.65E-04	1.07E-03	3.47E-04	-6.00E-01
EP-freshwater[2)]	kg Pe	5.72E-03	6.17E-06	3.52E-05	5.76E-03	1.01E-05	2.30E-07	MNR	MNR	MNR	MNR	MNR	1.80E-01	MNR	MNR	7.05E-07	4.09E-06	1.20E-06	-3.75E-03
EP-marine	kg Ne	1.34E-01	7.25E-03	1.58E-03	1.43E-01	1.55E-03	7.26E-05	MNR	MNR	MNR	MNR	MNR	1.29E+00	MNR	MNR	1.08E-04	2.50E-04	1.18E-04	-6.67E-02
EP-terrestrial	mol Ne	1.48E+00	8.06E-02	9.81E-03	1.57E+00	1.71E-02	7.53E-04	MNR	MNR	MNR	MNR	MNR	1.46E+01	MNR	MNR	1.20E-03	2.83E-03	1.17E-03	-7.67E-01
POCP ("smog")[3)]	kg NMVOCe	4.28E-01	2.12E-02	2.44E-03	4.52E-01	5.46E-03	1.88E-04	MNR	MNR	MNR	MNR	MNR	4.01E+00	MNR	MNR	3.82E-04	7.63E-04	3.37E-04	-2.22E-01
ADP-minerals & metals[4)]	kg Sbe	2.02E-03	2.07E-06	4.24E-06	2.02E-03	2.88E-06	7.23E-08	MNR	MNR	MNR	MNR	MNR	1.59E-02	MNR	MNR	2.02E-07	9.38E-06	1.46E-07	-2.38E-04
ADP-fossil resources	MJ	1.28E+03	1.64E+01	1.05E+01	1.31E+03	1.85E+01	1.70E-01	MNR	MNR	MNR	MNR	MNR	3.62E+04	MNR	MNR	1.29E+00	1.18E+00	7.40E-01	-5.86E+02
Water use[5)]	m^3e depr.	2.45E+01	5.74E-02	3.03E-01	2.49E+01	8.27E-02	4.04E-02	MNR	MNR	MNR	MNR	MNR	9.88E+02	MNR	MNR	5.79E-03	3.41E-02	5.09E-02	-3.85E+00

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	9.87E-06	7.08E-08	6.14E-08	1.00E-05	1.42E-07	1.60E-09	MNR	MNR	MNR	MNR	MNR	3.19E-05	MNR	MNR	9.92E-09	1.37E-08	6.46E-09	-3.23E-06
Ionizing radiation[6)]	kBq U235e	4.29E+00	7.65E-02	2.77E-02	4.39E+00	8.80E-02	6.18E-04	MNR	MNR	MNR	MNR	MNR	9.79E+02	MNR	MNR	6.16E-03	7.34E-03	3.73E-03	-3.51E+00

Ecotoxicity (freshwater)	CTUe	4.02E+03	1.19E+01	3.02E+01	4.06E+03	1.66E+01	1.18E+00	MNR	MNR	MNR	MNR	MNR	2.46E+04	MNR	MNR	1.16E+00	5.64E+00	4.18E+02	-1.08E+03
Human toxicity, cancer	CTUh	1.55E-07	6.36E-10	5.65E-10	1.56E-07	4.08E-10	5.29E-11	MNR	MNR	MNR	MNR	MNR	8.06E-07	MNR	MNR	2.86E-11	1.76E-10	3.97E-10	3.36E-09
Human tox. non-cancer	CTUh	3.17E-06	9.46E-09	9.24E-09	3.19E-06	1.64E-08	2.21E-09	MNR	MNR	MNR	MNR	MNR	2.65E-05	MNR	MNR	1.15E-09	7.44E-09	7.99E-09	-1.09E-06
SQP[7)]	-	3.60E+02	8.13E+00	2.31E+01	3.91E+02	2.13E+01	9.28E-02	MNR	MNR	MNR	MNR	MNR	6.54E+03	MNR	MNR	1.49E+00	2.05E+00	1.05E+00	-1.08E+02

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator; 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	9.27E+01	1.38E-01	8.45E+00	1.01E+02	2.08E-01	5.64E-03	MNR	MNR	MNR	MNR	MNR	7.36E+03	MNR	MNR	1.46E-02	1.66E-01	3.16E-02	-7.56E+00
Renew. PER as material	MJ	3.85E+00	0.00E+00	7.33E+00	1.12E+01	0.00E+00	-7.33E+00	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renew. PER	MJ	9.66E+01	1.38E-01	1.58E+01	1.12E+02	2.08E-01	-7.32E+00	MNR	MNR	MNR	MNR	MNR	7.36E+03	MNR	MNR	1.46E-02	1.66E-01	3.16E-02	-7.56E+00
Non-re. PER as energy	MJ	1.27E+03	1.64E+01	1.02E+01	1.30E+03	1.85E+01	1.70E-01	MNR	MNR	MNR	MNR	MNR	3.61E+04	MNR	MNR	1.29E+00	1.18E+00	7.40E-01	-5.87E+02
Non-re. PER as material	MJ	1.13E+01	0.00E+00	7.58E-02	1.14E+01	0.00E+00	-7.58E-02	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	-3.71E+00	-3.71E+00	0.00E+00
Total use of non-re. PER	MJ	1.28E+03	1.64E+01	1.03E+01	1.31E+03	1.85E+01	9.47E-02	MNR	MNR	MNR	MNR	MNR	3.61E+04	MNR	MNR	1.29E+00	-2.53E+00	-2.97E+00	-5.87E+02
Secondary materials	kg	4.01E-01	6.47E-03	5.70E-01	9.78E-01	5.13E-03	2.03E-04	MNR	MNR	MNR	MNR	MNR	3.72E+00	MNR	MNR	3.59E-04	1.14E-03	2.25E-03	2.46E+00
Renew. secondary fuels	MJ	6.57E-02	2.92E-05	4.04E-02	1.06E-01	5.18E-05	3.38E-06	MNR	MNR	MNR	MNR	MNR	3.02E-02	MNR	MNR	3.62E-06	5.94E-05	1.52E-05	-1.03E-03
Non-ren. secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	5.66E-01	1.43E-03	7.19E-03	5.75E-01	2.39E-03	7.13E-04	MNR	MNR	MNR	MNR	MNR	3.11E+01	MNR	MNR	1.68E-04	1.12E-03	4.97E-04	-1.79E-01

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D

Hazardous waste	kg	2.38E+01	2.22E-02	4.05E-02	2.39E+01	2.45E-02	1.99E-04	MNR	MNR	MNR	MNR	MNR	1.30E+02	MNR	MNR	1.71E-03	8.28E-03	3.99E-03	-9.44E+00
Non-hazardous waste	kg	1.98E+02	2.44E-01	6.55E-01	1.99E+02	4.02E-01	5.72E-01	MNR	MNR	MNR	MNR	MNR	8.21E+03	MNR	MNR	2.82E-02	4.51E-01	2.04E+00	-1.70E+02
Radioactive waste	kg	2.14E-03	1.14E-04	1.78E-05	2.27E-03	1.24E-04	2.73E-07	MNR	MNR	MNR	MNR	MNR	2.63E-01	MNR	MNR	8.65E-06	4.80E-06	0.00E+00	-1.29E-03

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	3.77E+00	0.00E+00	0.00E+00
Materials for energy rec	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	2.05E-01	2.05E-01	0.00E+00	0.00E+00	MNR	MNR	MNR	MNR	MNR	0.00E+00	MNR	MNR	0.00E+00	3.54E+00	0.00E+00	0.00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	1.27E+02	1.22E+00	8.24E-01	1.29E+02	1.22E+00	2.16E-02	MNR	MNR	MNR	MNR	MNR	1.68E+03	MNR	MNR	8.52E-02	4.72E-01	4.36E-01	-5.88E+01
Ozone depletion Pot.	kg CFC_{-11}e	4.26E-06	2.03E-07	8.20E-08	4.55E-06	2.24E-07	1.92E-09	MNR	MNR	MNR	MNR	MNR	7.48E-05	MNR	MNR	1.57E-08	8.35E-09	6.05E-09	-1.38E-06
Acidification	kg SO_2e	7.45E-01	2.33E-02	2.45E-03	7.70E-01	4.05E-03	1.25E-04	MNR	MNR	MNR	MNR	MNR	8.23E+00	MNR	MNR	2.83E-04	8.59E-04	2.68E-04	-5.17E-01
Eutrophication	kg PO_4^3e	2.14E-01	2.74E-03	1.80E-03	2.18E-01	9.22E-04	9.32E-05	MNR	MNR	MNR	MNR	MNR	6.34E+00	MNR	MNR	6.45E-05	2.98E-04	7.11E-04	-1.46E-01

POCP (“smog”)	kg C_2H_4e	4.25E-02	6.15E-04	1.69E-04	4.33E-02	1.58E-04	3.92E-06	MNR	MNR	MNR	MNR	MNR	3.37E-01	MNR	MNR	1.11E-05	3.18E-05	1.81E-05	-2.57E-02
ADP-elements	kg Sbe	1.99E-03	2.02E-06	3.69E-06	2.00E-03	2.79E-06	5.68E-08	MNR	MNR	MNR	MNR	MNR	1.58E-02	MNR	MNR	1.95E-07	9.37E-06	1.34E-07	-2.32E-04
ADP-fossil	MJ	1.28E+03	1.64E+01	1.05E+01	1.31E+03	1.85E+01	1.70E-01	MNR	MNR	MNR	MNR	MNR	3.61E+04	MNR	MNR	1.29E+00	1.18E+00	7.40E-01	-5.86E+02

APPENDIX (EPD HUB ALIGNED)

This section represents the scaling method for the **B6 module**, following the PEP EcoPassport PSR for luminaries (PSR-0014-ed2.0-EN-2023 07 13). The GWP results were scaled from a refernce variant of a product family, based on various light management scenarios and power inputs of the luminaires within the same product familiy

To calculate the Scaled Impact (*SI*), we have followed the below methods:

1. Calculate the power scaling factor (PSF), which is the ratio of the power input of the variant in questions P_{in} and the power input of the base variant P_{base}.

$$PSF = \frac{P_{in}}{P_{base}}$$

2. Calculate the Total Scaling factor by multiplying the PSF by the control scaling factor (CSF), where the CSF is determined according the relevant control factor scenario (e.g. if the luminaire has a presence detection system). The presented controls factors values in Table A1 are based on BS EN 15193-1:2017. Please refer to this publication or contact Signify directly for more information.

$$TSF = PSF * CSF$$

Table A1: Light management function (PEP EcoPassport aligned)

Scenario	Abbrev.	CSF
No control	NC	1
Daylight dependency factor	DD	0.75
Presence sensing	PS	0.75
Daylight dependency and presence sensing	DD+PS	0.55

3. Lastly, the GWP of the base variant is then scaled by the TSF.

$$Scaled\ Impact = GWP_{case} * TSF$$

Table A2 Scaled GWP per scaling factor (EPD Hub aligned)

Configuration	Flux [lm]	Power [W]	Efficacy [lm/W]	PSF	Total Scaling Factor (TSF)				Scaled Impacts (GWP100 B6 - kg CO2eq.)			
					NC	DD	PS	DD+PS	NC	DD	PS	DD+PS
VGP283, VGP293, VGP393 LED29-4S/730/730	2581.0	14.7	175.6	0.342	0.342	0.257	0.257	0.188	581.4	436.9	436.9	319.6
VGP283, VGP293, VGP393 LED30-4S/730/730	2670.0	15.2	175.7	0.353	0.353	0.265	0.265	0.194	600.1	450.5	450.5	329.8
VGP283, VGP293, VGP393 LED35-4S/730/730	3115.0	18.0	173.1	0.419	0.419	0.314	0.314	0.23	712.3	533.8	533.8	391.0
VGP283, VGP293, VGP393 LED40-4S/730/730	3560.0	20.9	170.3	0.486	0.486	0.364	0.364	0.267	826.2	618.8	618.8	453.9
VGP283, VGP293, VGP393 LED45-4S/730/730	4005.0	23.7	169.0	0.551	0.551	0.413	0.413	0.303	936.7	702.1	702.1	515.1
VGP283, VGP293, VGP393 LED50-4S/730/730	4450.0	26.6	167.3	0.619	0.619	0.464	0.464	0.34	1052.3	788.8	788.8	578.0
VGP283, VGP293, VGP393 LED55-4S/730/730	4895.0	29.5	165.9	0.686	0.686	0.515	0.515	0.377	1166.2	875.5	875.5	640.9
VGP283, VGP293, VGP393 LED60-4S/730/730	5340.0	32.4	164.8	0.753	0.753	0.565	0.565	0.414	1280.1	960.5	960.5	703.8
VGP283, VGP293, VGP393 LED65-4S/730/730	5785.0	35.3	163.9	0.821	0.821	0.616	0.616	0.452	1395.7	1047.2	1047.2	768.4
VGP283, VGP293, VGP393 LED70-4S/730/730	6230.0	38.2	163.1	0.888	0.888	0.666	0.666	0.488	1509.6	1132.2	1132.2	829.6
VGP283, VGP293, VGP393 LED75-4S/730/730	6675.0	40.1	166.5	0.933	0.933	0.7	0.7	0.513	1586.1	1190.0	1190.0	872.1
VGP283 80 4S/730 48V III DM10 48/60S	7120.0	43.0	165.6	1.0	1.0	0.75	0.75	0.55	1700.0	1275.0	1275.0	935.0

VGP283, VGP293, VGP393 LED85-4S/730/730	7565.0	45.9	164.8	1.067	1.067	0.8	0.8	0.587	1813.9	1360.0	1360.0	997.9
VGP283, VGP293, VGP393 LED90-4S/730/730	8010.0	48.8	164.1	1.135	1.135	0.851	0.851	0.624	1929.5	1446.7	1446.7	1060.8
VGP283, VGP293, VGP393 LED95-4S/730/730	8360.0	51.7	161.7	1.202	1.202	0.901	0.901	0.661	2043.4	1531.7	1531.7	1123.7
VGP283, VGP293, VGP393 LED100-4S/730/730	8800.0	54.6	161.2	1.27	1.27	0.953	0.953	0.699	2159.0	1620.1	1620.1	1188.3
VGP283, VGP293, VGP393 LED105-4S/730/730	9240.0	57.6	160.4	1.34	1.34	1.005	1.005	0.737	2278.0	1708.5	1708.5	1252.9
VGP283, VGP293, VGP393 LED110-4S/730/730	9680.0	60.6	159.7	1.409	1.409	1.057	1.057	0.775	2395.3	1796.9	1796.9	1317.5
VGP283, VGP293, VGP393 LED115-4S/730/730	10120.0	63.5	159.4	1.477	1.477	1.108	1.108	0.812	2510.9	1883.6	1883.6	1380.4
VGP283, VGP293, VGP393 LED120-4S/730/730	10560.0	65.1	162.2	1.514	1.514	1.135	1.135	0.833	2573.8	1929.5	1929.5	1416.1
VGP283, VGP293, VGP393 LED125-4S/730/730	11000.0	68.0	161.8	1.581	1.581	1.186	1.186	0.87	2687.7	2016.2	2016.2	1479.0
VGP283, VGP293, VGP393 LED130-4S/730/730	11310.0	70.9	159.5	1.649	1.649	1.237	1.237	0.907	2803.3	2102.9	2102.9	1541.9
VGP283, VGP293, VGP393 LED135-4S/730/730	11745.0	73.8	159.1	1.716	1.716	1.287	1.287	0.944	2917.2	2187.9	2187.9	1604.8
VGP283, VGP293, VGP393 LED140-4S/730/730	12180.0	76.8	158.6	1.786	1.786	1.34	1.34	0.982	3036.2	2278.0	2278.0	1669.4
VGP283, VGP293, VGP393 LED145-4S/730/730	12615.0	79.8	158.1	1.856	1.856	1.392	1.392	1.021	3155.2	2366.4	2366.4	1735.7
VGP283, VGP293, VGP393 LED150-4S/730/730	13050.0	82.7	157.8	1.923	1.923	1.442	1.442	1.058	3269.1	2451.4	2451.4	1798.6
VGP283, VGP293, VGP393 LED155-4S/730/730	13485.0	85.7	157.4	1.993	1.993	1.495	1.495	1.096	3388.1	2541.5	2541.5	1863.2
VGP283, VGP293, VGP393 LED160-4S/730/730	13760.0	88.7	155.1	2.063	2.063	1.547	1.547	1.135	3507.1	2629.9	2629.9	1929.5
VGP283, VGP293, VGP393 LED165-4S/730/730	14190.0	91.7	154.7	2.133	2.133	1.6	1.6	1.173	3626.1	2720.0	2720.0	1994.1
VGP283, VGP293, VGP393 LED170-4S/730/730	14620.0	94.8	154.2	2.205	2.205	1.654	1.654	1.213	3748.5	2811.8	2811.8	2062.1
VGP283, VGP293, VGP393 LED175-4S/730/730	15050.0	97.8	153.9	2.274	2.274	1.706	1.706	1.251	3865.8	2900.2	2900.2	2126.7
VGP283, VGP293, VGP393 LED180-4S/730/730	15480.0	100.9	153.4	2.347	2.347	1.76	1.76	1.291	3989.9	2992.0	2992.0	2194.7
VGP283, VGP293, VGP393 LED185-4S/730/730	15725.0	103.9	151.3	2.416	2.416	1.812	1.812	1.329	4107.2	3080.4	3080.4	2259.3
VGP283, VGP293, VGP393 LED190-4S/730/730	16150.0	107.0	150.9	2.488	2.488	1.866	1.866	1.368	4229.6	3172.2	3172.2	2325.6
VGP283, VGP293, VGP393 LED195-4S/730/730	16575.0	110.1	150.5	2.56	2.56	1.92	1.92	1.408	4352.0	3264.0	3264.0	2393.6
VGP283, VGP293, VGP393 LED200-4S/730/730	17000.0	113.2	150.2	2.633	2.633	1.975	1.975	1.448	4476.1	3357.5	3357.5	2461.6

VGP283, VGP293, VGP393 LED205-4S/730/730	17425.0	116.3	149.8	2.705	2.705	2.029	2.029	1.488	4598.5	3449.3	3449.3	2529.6
VGP283, VGP293, VGP393 LED210-4S/730/730	17850.0	119.5	149.4	2.779	2.779	2.084	2.084	1.528	4724.3	3542.8	3542.8	2597.6
VGP283, VGP293, VGP393 LED215-4S/730/730	18060.0	122.6	147.3	2.851	2.851	2.138	2.138	1.568	4846.7	3634.6	3634.6	2665.6
VGP283, VGP293, VGP393 LED220-4S/730/730	18480.0	125.8	146.9	2.926	2.926	2.195	2.195	1.609	4974.2	3731.5	3731.5	2735.3
VGP283, VGP293, VGP393 LED225-4S/730/730	18900.0	129.0	146.5	3.0	3.0	2.25	2.25	1.65	5100.0	3825.0	3825.0	2805.0
VGP283, VGP293, VGP393 LED228-4S/730/730	19152.0	130.9	146.3	3.044	3.044	2.283	2.283	1.674	5174.8	3881.1	3881.1	2845.8
VGP283, VGP293, VGP393 LED29-4S/740/740	2581.0	14.0	184.4	0.326	0.326	0.244	0.244	0.179	554.2	414.8	414.8	304.3
VGP283, VGP293, VGP393 LED30-4S/740/740	2670.0	14.5	184.1	0.337	0.337	0.253	0.253	0.185	572.9	430.1	430.1	314.5
VGP283, VGP293, VGP393 LED35-4S/740/740	3115.0	17.2	181.1	0.4	0.4	0.3	0.3	0.22	680.0	510.0	510.0	374.0
VGP283, VGP293, VGP393 LED40-4S/740/740	3560.0	19.9	178.9	0.463	0.463	0.347	0.347	0.255	787.1	589.9	589.9	433.5
VGP283, VGP293, VGP393 LED45-4S/740/740	4005.0	22.6	177.2	0.526	0.526	0.395	0.395	0.289	894.2	671.5	671.5	491.3
VGP283, VGP293, VGP393 LED50-4S/740/740	4450.0	25.4	175.2	0.591	0.591	0.443	0.443	0.325	1004.7	753.1	753.1	552.5
VGP283, VGP293, VGP393 LED55-4S/740/740	4895.0	28.1	174.2	0.653	0.653	0.49	0.49	0.359	1110.1	833.0	833.0	610.3
VGP283, VGP293, VGP393 LED60-4S/740/740	5340.0	30.9	172.8	0.719	0.719	0.539	0.539	0.395	1222.3	916.3	916.3	671.5
VGP283, VGP293, VGP393 LED65-4S/740/740	5785.0	33.7	171.7	0.784	0.784	0.588	0.588	0.431	1332.8	999.6	999.6	732.7
VGP283, VGP293, VGP393 LED70-4S/740/740	6230.0	36.5	170.7	0.849	0.849	0.637	0.637	0.467	1443.3	1082.9	1082.9	793.9
VGP283, VGP293, VGP393 LED75-4S/740/740	6675.0	38.3	174.3	0.891	0.891	0.668	0.668	0.49	1514.7	1135.6	1135.6	833.0
VGP283, VGP293, VGP393 LED80-4S/740/740	7120.0	41.1	173.2	0.956	0.956	0.717	0.717	0.526	1625.2	1218.9	1218.9	894.2
VGP283, VGP293, VGP393 LED85-4S/740/740	7565.0	43.8	172.7	1.019	1.019	0.764	0.764	0.56	1732.3	1298.8	1298.8	952.0
VGP283, VGP293, VGP393 LED90-4S/740/740	8010.0	46.6	171.9	1.084	1.084	0.813	0.813	0.596	1842.8	1382.1	1382.1	1013.2
VGP283, VGP293, VGP393 LED95-4S/740/740	8360.0	49.4	169.2	1.149	1.149	0.862	0.862	0.632	1953.3	1465.4	1465.4	1074.4
VGP283, VGP293, VGP393 LED100-4S/740/740	8800.0	52.2	168.6	1.214	1.214	0.91	0.91	0.668	2063.8	1547.0	1547.0	1135.6
VGP283, VGP293, VGP393 LED105-4S/740/740	9240.0	55.0	168.0	1.279	1.279	0.959	0.959	0.703	2174.3	1630.3	1630.3	1195.1
VGP283, VGP293, VGP393 LED110-4S/740/740	9680.0	57.9	167.2	1.347	1.347	1.01	1.01	0.741	2289.9	1717.0	1717.0	1259.7

VGP283, VGP293, VGP393 LED115-4S/740/740	10120.0	60.7	166.7	1.412	1.412	1.059	1.059	0.777	2400.4	1800.3	1800.3	1320.9
VGP283, VGP293, VGP393 LED120-4S/740/740	10560.0	62.2	169.8	1.447	1.447	1.085	1.085	0.796	2459.9	1844.5	1844.5	1353.2
VGP283, VGP293, VGP393 LED125-4S/740/740	11000.0	65.0	169.2	1.512	1.512	1.134	1.134	0.832	2570.4	1927.8	1927.8	1414.4
VGP283, VGP293, VGP393 LED130-4S/740/740	11440.0	67.8	168.7	1.577	1.577	1.183	1.183	0.867	2680.9	2011.1	2011.1	1473.9
VGP283, VGP293, VGP393 LED135-4S/740/740	11745.0	70.6	166.4	1.642	1.642	1.232	1.232	0.903	2791.4	2094.4	2094.4	1535.1
VGP283, VGP293, VGP393 LED140-4S/740/740	12180.0	73.4	165.9	1.707	1.707	1.28	1.28	0.939	2901.9	2176.0	2176.0	1596.3
VGP283, VGP293, VGP393 LED145-4S/740/740	12615.0	76.3	165.3	1.774	1.774	1.331	1.331	0.976	3015.8	2262.7	2262.7	1659.2
VGP283, VGP293, VGP393 LED150-4S/740/740	13050.0	79.1	165.0	1.84	1.84	1.38	1.38	1.012	3128.0	2346.0	2346.0	1720.4
VGP283, VGP293, VGP393 LED155-4S/740/740	13485.0	82.0	164.5	1.907	1.907	1.43	1.43	1.049	3241.9	2431.0	2431.0	1783.3
VGP283, VGP293, VGP393 LED160-4S/740/740	13920.0	84.8	164.2	1.972	1.972	1.479	1.479	1.085	3352.4	2514.3	2514.3	1844.5
VGP283, VGP293, VGP393 LED165-4S/740/740	14355.0	87.7	163.7	2.04	2.04	1.53	1.53	1.122	3468.0	2601.0	2601.0	1907.4
VGP283, VGP293, VGP393 LED170-4S/740/740	14620.0	90.6	161.4	2.107	2.107	1.58	1.58	1.159	3581.9	2686.0	2686.0	1970.3
VGP283, VGP293, VGP393 LED175-4S/740/740	15050.0	93.5	161.0	2.174	2.174	1.631	1.631	1.196	3695.8	2772.7	2772.7	2033.2
VGP283, VGP293, VGP393 LED180-4S/740/740	15480.0	96.4	160.6	2.242	2.242	1.681	1.681	1.233	3811.4	2857.7	2857.7	2096.1
VGP283, VGP293, VGP393 LED185-4S/740/740	15910.0	99.4	160.1	2.312	2.312	1.734	1.734	1.272	3930.4	2947.8	2947.8	2162.4
VGP283, VGP293, VGP393 LED190-4S/740/740	16340.0	102.3	159.7	2.379	2.379	1.784	1.784	1.308	4044.3	3032.8	3032.8	2223.6
VGP283, VGP293, VGP393 LED195-4S/740/740	16770.0	105.3	159.3	2.449	2.449	1.837	1.837	1.347	4163.3	3122.9	3122.9	2289.9
VGP283, VGP293, VGP393 LED200-4S/740/740	17200.0	108.2	159.0	2.516	2.516	1.887	1.887	1.384	4277.2	3207.9	3207.9	2352.8
VGP283, VGP293, VGP393 LED205-4S/740/740	17630.0	111.2	158.5	2.586	2.586	1.939	1.939	1.422	4396.2	3296.3	3296.3	2417.4
VGP283, VGP293, VGP393 LED210-4S/740/740	18060.0	114.2	158.1	2.656	2.656	1.992	1.992	1.461	4515.2	3386.4	3386.4	2483.7
VGP283, VGP293, VGP393 LED215-4S/740/740	18275.0	117.2	155.9	2.726	2.726	2.045	2.045	1.499	4634.2	3476.5	3476.5	2548.3
VGP283, VGP293, VGP393 LED220-4S/740/740	18700.0	120.2	155.6	2.795	2.795	2.096	2.096	1.537	4751.5	3563.2	3563.2	2612.9
VGP283, VGP293, VGP393 LED225-4S/740/740	19125.0	123.2	155.2	2.865	2.865	2.149	2.149	1.576	4870.5	3653.3	3653.3	2679.2
VGP283, VGP293, VGP393 LED228-4S/740/740	19380.0	125.1	154.9	2.909	2.909	2.182	2.182	1.6	4945.3	3709.4	3709.4	2720.0

VGP283, VGP293, VGP393 LED29-4S/830/830	2581.0	15.7	164.4	0.365	0.365	0.274	0.274	0.201	620.5	465.8	465.8	341.7
VGP283, VGP293, VGP393 LED30-4S/830/830	2670.0	16.3	163.8	0.379	0.379	0.284	0.284	0.208	644.3	482.8	482.8	353.6
VGP283, VGP293, VGP393 LED35-4S/830/830	3115.0	19.5	159.7	0.453	0.453	0.34	0.34	0.249	770.1	578.0	578.0	423.3
VGP283, VGP293, VGP393 LED40-4S/830/830	3560.0	22.7	156.8	0.528	0.528	0.396	0.396	0.29	897.6	673.2	673.2	493.0
VGP283, VGP293, VGP393 LED45-4S/830/830	4005.0	25.8	155.2	0.6	0.6	0.45	0.45	0.33	1020.0	765.0	765.0	561.0
VGP283, VGP293, VGP393 LED50-4S/830/830	4450.0	29.1	152.9	0.677	0.677	0.508	0.508	0.372	1150.9	863.6	863.6	632.4
VGP283, VGP293, VGP393 LED55-4S/830/830	4895.0	32.3	151.5	0.751	0.751	0.563	0.563	0.413	1276.7	957.1	957.1	702.1
VGP283, VGP293, VGP393 LED60-4S/830/830	5340.0	35.6	150.0	0.828	0.828	0.621	0.621	0.455	1407.6	1055.7	1055.7	773.5
VGP283, VGP293, VGP393 LED65-4S/830/830	5785.0	38.9	148.7	0.905	0.905	0.679	0.679	0.498	1538.5	1154.3	1154.3	846.6
VGP283, VGP293, VGP393 LED70-4S/830/830	6230.0	42.2	147.6	0.981	0.981	0.736	0.736	0.54	1667.7	1251.2	1251.2	918.0
VGP283, VGP293, VGP393 LED75-4S/830/830	6675.0	44.0	151.7	1.023	1.023	0.767	0.767	0.563	1739.1	1303.9	1303.9	957.1
VGP283, VGP293, VGP393 LED80-4S/830/830	7040.0	47.2	149.2	1.098	1.098	0.824	0.824	0.604	1866.6	1400.8	1400.8	1026.8
VGP283, VGP293, VGP393 LED85-4S/830/830	7480.0	50.5	148.1	1.174	1.174	0.88	0.88	0.646	1995.8	1496.0	1496.0	1098.2
VGP283, VGP293, VGP393 LED90-4S/830/830	7920.0	53.8	147.2	1.251	1.251	0.938	0.938	0.688	2126.7	1594.6	1594.6	1169.6
VGP283, VGP293, VGP393 LED95-4S/830/830	8360.0	57.1	146.4	1.328	1.328	0.996	0.996	0.73	2257.6	1693.2	1693.2	1241.0
VGP283, VGP293, VGP393 LED100-4S/830/830	8800.0	60.4	145.7	1.405	1.405	1.054	1.054	0.773	2388.5	1791.8	1791.8	1314.1
VGP283, VGP293, VGP393 LED105-4S/830/830	9135.0	63.8	143.2	1.484	1.484	1.113	1.113	0.816	2522.8	1892.1	1892.1	1387.2
VGP283, VGP293, VGP393 LED110-4S/830/830	9570.0	67.1	142.6	1.56	1.56	1.17	1.17	0.858	2652.0	1989.0	1989.0	1458.6
VGP283, VGP293, VGP393 LED115-4S/830/830	10005.0	70.5	141.9	1.64	1.64	1.23	1.23	0.902	2788.0	2091.0	2091.0	1533.4
VGP283, VGP293, VGP393 LED120-4S/830/830	10440.0	71.9	145.2	1.672	1.672	1.254	1.254	0.92	2842.4	2131.8	2131.8	1564.0
VGP283, VGP293, VGP393 LED125-4S/830/830	10875.0	75.2	144.6	1.749	1.749	1.312	1.312	0.962	2973.3	2230.4	2230.4	1635.4
VGP283, VGP293, VGP393 LED130-4S/830/830	11180.0	78.5	142.4	1.826	1.826	1.369	1.369	1.004	3104.2	2327.3	2327.3	1706.8
VGP283, VGP293, VGP393 LED135-4S/830/830	11610.0	81.8	141.9	1.902	1.902	1.426	1.426	1.046	3233.4	2424.2	2424.2	1778.2
VGP283, VGP293, VGP393 LED140-4S/830/830	12040.0	85.2	141.3	1.981	1.981	1.486	1.486	1.09	3367.7	2526.2	2526.2	1853.0

VGP283, VGP293, VGP393 LED145-4S/830/830	12470.0	88.5	140.9	2.058	2.058	1.543	1.543	1.132	3498.6	2623.1	2623.1	1924.4
VGP283, VGP293, VGP393 LED150-4S/830/830	12750.0	91.9	138.7	2.137	2.137	1.603	1.603	1.175	3632.9	2725.1	2725.1	1997.5
VGP283, VGP293, VGP393 LED155-4S/830/830	13175.0	95.3	138.2	2.216	2.216	1.662	1.662	1.219	3767.2	2825.4	2825.4	2072.3
VGP283, VGP293, VGP393 LED160-4S/830/830	13600.0	98.7	137.8	2.295	2.295	1.721	1.721	1.262	3901.5	2925.7	2925.7	2145.4
VGP283, VGP293, VGP393 LED165-4S/830/830	14025.0	102.2	137.2	2.377	2.377	1.783	1.783	1.307	4040.9	3031.1	3031.1	2221.9
VGP283, VGP293, VGP393 LED170-4S/830/830	14280.0	105.6	135.2	2.456	2.456	1.842	1.842	1.351	4175.2	3131.4	3131.4	2296.7
VGP283, VGP293, VGP393 LED175-4S/830/830	14700.0	109.1	134.7	2.537	2.537	1.903	1.903	1.395	4312.9	3235.1	3235.1	2371.5
VGP283, VGP293, VGP393 LED180-4S/830/830	15120.0	112.5	134.4	2.616	2.616	1.962	1.962	1.439	4447.2	3335.4	3335.4	2446.3
VGP283, VGP293, VGP393 LED185-4S/830/830	15540.0	116.0	134.0	2.698	2.698	2.023	2.023	1.484	4586.6	3439.1	3439.1	2522.8
VGP283, VGP293, VGP393 LED190-4S/830/830	15770.0	119.6	131.9	2.781	2.781	2.086	2.086	1.53	4727.7	3546.2	3546.2	2601.0
VGP283, VGP293, VGP393 LED195-4S/830/830	16185.0	123.1	131.5	2.863	2.863	2.147	2.147	1.575	4867.1	3649.9	3649.9	2677.5
VGP283, VGP293, VGP393 LED200-4S/830/830	16600.0	126.7	131.0	2.947	2.947	2.21	2.21	1.621	5009.9	3757.0	3757.0	2755.7
VGP283, VGP293, VGP393 LED205-4S/830/830	17015.0	130.2	130.7	3.028	3.028	2.271	2.271	1.665	5147.6	3860.7	3860.7	2830.5
VGP283, VGP293, VGP393 LED210-4S/830/830	17220.0	133.8	128.7	3.112	3.112	2.334	2.334	1.712	5290.4	3967.8	3967.8	2910.4
VGP283, VGP293, VGP393 LED215-4S/830/830	17630.0	137.4	128.3	3.195	3.195	2.396	2.396	1.757	5431.5	4073.2	4073.2	2986.9
VGP283, VGP293, VGP393 LED220-4S/830/830	18040.0	141.1	127.9	3.281	3.281	2.461	2.461	1.805	5577.7	4183.7	4183.7	3068.5

** Note that if the product is non-dimmable, only the values for "NC (No Control)" are valid; if the driver type is PSU, only the values for "NC (No Control)"and "PS (presence sensing)" for are valid.*

APPENDIX (PEP ECOPASSPORT ALIGNED)

This section represents the scaling method for the **B6 module**, following the PEP EcoPassport PSR for luminaries (PSR-0014-ed2.0-EN-2023 07 13). The GWP results were scaled from a refernce variant of a product family, based on various light management functions, the lumen output (O_{lum}) and reference service life (*RSL*) of each product within the same product familiy.

To calculate the Scaled Impact (SI_{pep}), we have followed the below methods:

1. Calculate the power scaling factor (PSF), which is the ratio of the power input of the variant in questions P_{in} and the power input of the base variant P_{base}.

$$PSF = \frac{P_{in}}{P_{base}}$$

2. Using this scaled GWP, we then can apply the PEP Ecopassport method for calculating the environmental impact of the functional unit for a luminary (1000 lumens over 35000 hours), applied to B6, where the Functional Unit application considers the lumen output (Olum) and reference service lifetime (RSL) of the product to estimate the final environmental impact. The scaled impact (SIpep) is presented in Table A4.

$$GSF = \frac{FU_{pep}}{FU_p} = \frac{1{,}000}{O_{lum}} * \frac{35{,}000}{RSL}$$

3. Calculate the GWP scaling factor (P*GSF*), by multiplying the PSF by the GSF.

$$PGSF = PSF * GSF$$

4. Calculate the Total Scaling factor by multiplying the PSF by the control scaling factor (CSF), where the CSF is determined according the relevant control factor scenario (e.g. if the luminaire has a presence detection system), as presented in Table A1.

$$TSF = PGSF * CSF$$

Table A3: Light management functions (PEP EcoPassport aligned)

Scenario	Abbrev.	CSF
No control	NC	1
Daylight dependency factor	DD	0.75
Presence sensing	PS	0.75
Daylight dependency and presence sensing	DD+PS	0.55

5. Lastly, the GWP of the base variant is then scaled by the TSF.

$$Scaled\ GWP = GWP_{case} * TSF$$

As described in the EPD, calculations are made based on dataset describing electricity available on the low voltage level in Europe for year 2022 (source Ecoinvent 3.8 database). This value should be adjusted depending on specific project requirements. Presented controls factors and functional unit conversion values are based on the PEP EcoPassport PSR for luminaries (PSR-0014-ed2.0-EN-2023 07 13). Please refer to this publication or contact Signify directly for more information.

Table A4 Scale impact per scaling factor (PEP EcoPassport aligned)

Description	Flux [lm]	Power [W]	Efficacy [lm/W]	PSF	NC	DD	PS	DD+PS	NC	DD	PS	DD+PS
VGP283, VGP293, VGP393 LED29-4S/730/730	2581	14.7	175.58	0.34	0.34	0.26	0.26	0.19	78.8	59.1	59.1	43.3
VGP283, VGP293, VGP393 LED30-4S/730/730	2670	15.2	175.66	0.35	0.35	0.27	0.27	0.19	78.8	59.1	59.1	43.3
VGP283, VGP293, VGP393 LED35-4S/730/730	3115	18	173.06	0.42	0.42	0.31	0.31	0.23	80.0	60.0	60.0	44.0

VGP283, VGP293, VGP393 LED40-4S/730/730	3560	20.9	170.33	0.49	0.49	0.36	0.36	0.27	81.2	60.9	60.9	44.7
VGP283, VGP293, VGP393 LED45-4S/730/730	4005	23.7	168.99	0.55	0.55	0.41	0.41	0.30	81.9	61.4	61.4	45.0
VGP283, VGP293, VGP393 LED50-4S/730/730	4450	26.6	167.29	0.62	0.62	0.46	0.46	0.34	82.7	62.0	62.0	45.5
VGP283, VGP293, VGP393 LED55-4S/730/730	4895	29.5	165.93	0.69	0.69	0.51	0.51	0.38	83.4	62.5	62.5	45.9
VGP283, VGP293, VGP393 LED60-4S/730/730	5340	32.4	164.81	0.75	0.75	0.57	0.57	0.41	84.0	63.0	63.0	46.2
VGP283, VGP293, VGP393 LED65-4S/730/730	5785	35.3	163.88	0.82	0.82	0.62	0.62	0.45	84.4	63.3	63.3	46.4
VGP283, VGP293, VGP393 LED70-4S/730/730	6230	38.2	163.09	0.89	0.89	0.67	0.67	0.49	84.8	63.6	63.6	46.7
VGP283, VGP293, VGP393 LED75-4S/730/730	6675	40.1	166.46	0.93	0.93	0.70	0.70	0.51	83.1	62.3	62.3	45.7
VGP283 80 4S/730 48V III DM10 48/60S	7120	43	165.58	1.00	1.00	0.75	0.75	0.55	83.6	62.7	62.7	46.0
VGP283, VGP293, VGP393 LED85-4S/730/730	7565	45.9	164.81	1.07	1.07	0.80	0.80	0.59	84.0	63.0	63.0	46.2
VGP283, VGP293, VGP393 LED90-4S/730/730	8010	48.8	164.14	1.13	1.13	0.85	0.85	0.62	84.3	63.2	63.2	46.4
VGP283, VGP293, VGP393 LED95-4S/730/730	8360	51.7	161.70	1.20	1.20	0.90	0.90	0.66	85.6	64.2	64.2	47.1
VGP283, VGP293, VGP393 LED100-4S/730/730	8800	54.6	161.17	1.27	1.27	0.95	0.95	0.70	85.9	64.4	64.4	47.2
VGP283, VGP293, VGP393 LED105-4S/730/730	9240	57.6	160.42	1.34	1.34	1.00	1.00	0.74	86.3	64.7	64.7	47.4
VGP283, VGP293, VGP393 LED110-4S/730/730	9680	60.6	159.74	1.41	1.41	1.06	1.06	0.78	86.6	65.0	65.0	47.6
VGP283, VGP293, VGP393 LED115-4S/730/730	10120	63.5	159.37	1.48	1.48	1.11	1.11	0.81	86.8	65.1	65.1	47.8
VGP283, VGP293, VGP393 LED120-4S/730/730	10560	65.1	162.21	1.51	1.51	1.14	1.14	0.83	85.3	64.0	64.0	46.9
VGP283, VGP293, VGP393 LED125-4S/730/730	11000	68	161.76	1.58	1.58	1.19	1.19	0.87	85.5	64.2	64.2	47.0
VGP283, VGP293, VGP393 LED130-4S/730/730	11310	70.9	159.52	1.65	1.65	1.24	1.24	0.91	86.7	65.1	65.1	47.7
VGP283, VGP293, VGP393 LED135-4S/730/730	11745	73.8	159.15	1.72	1.72	1.29	1.29	0.94	86.9	65.2	65.2	47.8
VGP283, VGP293, VGP393 LED140-4S/730/730	12180	76.8	158.59	1.79	1.79	1.34	1.34	0.98	87.2	65.4	65.4	48.0
VGP283, VGP293, VGP393 LED145-4S/730/730	12615	79.8	158.08	1.86	1.86	1.39	1.39	1.02	87.5	65.6	65.6	48.1
VGP283, VGP293, VGP393 LED150-4S/730/730	13050	82.7	157.80	1.92	1.92	1.44	1.44	1.06	87.7	65.8	65.8	48.2
VGP283, VGP293, VGP393 LED155-4S/730/730	13485	85.7	157.35	1.99	1.99	1.49	1.49	1.10	87.9	66.0	66.0	48.4
VGP283, VGP293, VGP393 LED160-4S/730/730	13760	88.7	155.13	2.06	2.06	1.55	1.55	1.13	89.2	66.9	66.9	49.1
VGP283, VGP293, VGP393 LED165-4S/730/730	14190	91.7	154.74	2.13	2.13	1.60	1.60	1.17	89.4	67.1	67.1	49.2
VGP283, VGP293, VGP393 LED170-4S/730/730	14620	94.8	154.22	2.20	2.20	1.65	1.65	1.21	89.7	67.3	67.3	49.3
VGP283, VGP293, VGP393 LED175-4S/730/730	15050	97.8	153.89	2.27	2.27	1.71	1.71	1.25	89.9	67.4	67.4	49.5
VGP283, VGP293, VGP393 LED180-4S/730/730	15480	100.9	153.42	2.35	2.35	1.76	1.76	1.29	90.2	67.6	67.6	49.6
VGP283, VGP293, VGP393 LED185-4S/730/730	15725	103.9	151.35	2.42	2.42	1.81	1.81	1.33	91.4	68.6	68.6	50.3
VGP283, VGP293, VGP393 LED190-4S/730/730	16150	107	150.93	2.49	2.49	1.87	1.87	1.37	91.7	68.8	68.8	50.4
VGP283, VGP293, VGP393 LED195-4S/730/730	16575	110.1	150.54	2.56	2.56	1.92	1.92	1.41	91.9	68.9	68.9	50.6

VGP283, VGP293, VGP393 LED200-4S/730/730	17000	113.2	150.18	2.63	2.63	1.97	1.97	1.45	92.1	69.1	69.1	50.7
VGP283, VGP293, VGP393 LED205-4S/730/730	17425	116.3	149.83	2.70	2.70	2.03	2.03	1.49	92.4	69.3	69.3	50.8
VGP283, VGP293, VGP393 LED210-4S/730/730	17850	119.5	149.37	2.78	2.78	2.08	2.08	1.53	92.6	69.5	69.5	50.9
VGP283, VGP293, VGP393 LED215-4S/730/730	18060	122.6	147.31	2.85	2.85	2.14	2.14	1.57	93.9	70.5	70.5	51.7
VGP283, VGP293, VGP393 LED220-4S/730/730	18480	125.8	146.90	2.93	2.93	2.19	2.19	1.61	94.2	70.6	70.6	51.8
VGP283, VGP293, VGP393 LED225-4S/730/730	18900	129	146.51	3.00	3.00	2.25	2.25	1.65	94.4	70.8	70.8	51.9
VGP283, VGP293, VGP393 LED228-4S/730/730	19152	130.9	146.31	3.04	3.04	2.28	2.28	1.67	94.6	70.9	70.9	52.0
VGP283, VGP293, VGP393 LED29-4S/740/740	2581	14	184.36	0.33	0.33	0.24	0.24	0.18	75.1	56.3	56.3	41.3
VGP283, VGP293, VGP393 LED30-4S/740/740	2670	14.5	184.14	0.34	0.34	0.25	0.25	0.19	75.1	56.4	56.4	41.3
VGP283, VGP293, VGP393 LED35-4S/740/740	3115	17.2	181.10	0.40	0.40	0.30	0.30	0.22	76.4	57.3	57.3	42.0
VGP283, VGP293, VGP393 LED40-4S/740/740	3560	19.9	178.89	0.46	0.46	0.35	0.35	0.25	77.3	58.0	58.0	42.5
VGP283, VGP293, VGP393 LED45-4S/740/740	4005	22.6	177.21	0.53	0.53	0.39	0.39	0.29	78.1	58.6	58.6	42.9
VGP283, VGP293, VGP393 LED50-4S/740/740	4450	25.4	175.20	0.59	0.59	0.44	0.44	0.32	79.0	59.2	59.2	43.4
VGP283, VGP293, VGP393 LED55-4S/740/740	4895	28.1	174.20	0.65	0.65	0.49	0.49	0.36	79.4	59.6	59.6	43.7
VGP283, VGP293, VGP393 LED60-4S/740/740	5340	30.9	172.82	0.72	0.72	0.54	0.54	0.40	80.1	60.1	60.1	44.0
VGP283, VGP293, VGP393 LED65-4S/740/740	5785	33.7	171.66	0.78	0.78	0.59	0.59	0.43	80.6	60.5	60.5	44.3
VGP283, VGP293, VGP393 LED70-4S/740/740	6230	36.5	170.68	0.85	0.85	0.64	0.64	0.47	81.1	60.8	60.8	44.6
VGP283, VGP293, VGP393 LED75-4S/740/740	6675	38.3	174.28	0.89	0.89	0.67	0.67	0.49	79.4	59.5	59.5	43.7
VGP283, VGP293, VGP393 LED80-4S/740/740	7120	41.1	173.24	0.96	0.96	0.72	0.72	0.53	79.9	59.9	59.9	43.9
VGP283, VGP293, VGP393 LED85-4S/740/740	7565	43.8	172.72	1.02	1.02	0.76	0.76	0.56	80.1	60.1	60.1	44.1
VGP283, VGP293, VGP393 LED90-4S/740/740	8010	46.6	171.89	1.08	1.08	0.81	0.81	0.60	80.5	60.4	60.4	44.3
VGP283, VGP293, VGP393 LED95-4S/740/740	8360	49.4	169.23	1.15	1.15	0.86	0.86	0.63	81.8	61.3	61.3	45.0
VGP283, VGP293, VGP393 LED100-4S/740/740	8800	52.2	168.58	1.21	1.21	0.91	0.91	0.67	82.1	61.6	61.6	45.1
VGP283, VGP293, VGP393 LED105-4S/740/740	9240	55	168.00	1.28	1.28	0.96	0.96	0.70	82.4	61.8	61.8	45.3
VGP283, VGP293, VGP393 LED110-4S/740/740	9680	57.9	167.18	1.35	1.35	1.01	1.01	0.74	82.8	62.1	62.1	45.5
VGP283, VGP293, VGP393 LED115-4S/740/740	10120	60.7	166.72	1.41	1.41	1.06	1.06	0.78	83.0	62.2	62.2	45.6
VGP283, VGP293, VGP393 LED120-4S/740/740	10560	62.2	169.77	1.45	1.45	1.08	1.08	0.80	81.5	61.1	61.1	44.8
VGP283, VGP293, VGP393 LED125-4S/740/740	11000	65	169.23	1.51	1.51	1.13	1.13	0.83	81.8	61.3	61.3	45.0
VGP283, VGP293, VGP393 LED130-4S/740/740	11440	67.8	168.73	1.58	1.58	1.18	1.18	0.87	82.0	61.5	61.5	45.1
VGP283, VGP293, VGP393 LED135-4S/740/740	11745	70.6	166.36	1.64	1.64	1.23	1.23	0.90	83.2	62.4	62.4	45.7

VGP283, VGP293, VGP393 LED140-4S/740/740	12180	73.4	165.94	1.71	1.71	1.28	1.28	0.94	83.4	62.5	62.5	45.9
VGP283, VGP293, VGP393 LED145-4S/740/740	12615	76.3	165.33	1.77	1.77	1.33	1.33	0.98	83.7	62.8	62.8	46.0
VGP283, VGP293, VGP393 LED150-4S/740/740	13050	79.1	164.98	1.84	1.84	1.38	1.38	1.01	83.9	62.9	62.9	46.1
VGP283, VGP293, VGP393 LED155-4S/740/740	13485	82	164.45	1.91	1.91	1.43	1.43	1.05	84.1	63.1	63.1	46.3
VGP283, VGP293, VGP393 LED160-4S/740/740	13920	84.8	164.15	1.97	1.97	1.48	1.48	1.08	84.3	63.2	63.2	46.4
VGP283, VGP293, VGP393 LED165-4S/740/740	14355	87.7	163.68	2.04	2.04	1.53	1.53	1.12	84.5	63.4	63.4	46.5
VGP283, VGP293, VGP393 LED170-4S/740/740	14620	90.6	161.37	2.11	2.11	1.58	1.58	1.16	85.7	64.3	64.3	47.2
VGP283, VGP293, VGP393 LED175-4S/740/740	15050	93.5	160.96	2.17	2.17	1.63	1.63	1.20	86.0	64.5	64.5	47.3
VGP283, VGP293, VGP393 LED180-4S/740/740	15480	96.4	160.58	2.24	2.24	1.68	1.68	1.23	86.2	64.6	64.6	47.4
VGP283, VGP293, VGP393 LED185-4S/740/740	15910	99.4	160.06	2.31	2.31	1.73	1.73	1.27	86.4	64.8	64.8	47.5
VGP283, VGP293, VGP393 LED190-4S/740/740	16340	102.3	159.73	2.38	2.38	1.78	1.78	1.31	86.6	65.0	65.0	47.6
VGP283, VGP293, VGP393 LED195-4S/740/740	16770	105.3	159.26	2.45	2.45	1.84	1.84	1.35	86.9	65.2	65.2	47.8
VGP283, VGP293, VGP393 LED200-4S/740/740	17200	108.2	158.96	2.52	2.52	1.89	1.89	1.38	87.0	65.3	65.3	47.9
VGP283, VGP293, VGP393 LED205-4S/740/740	17630	111.2	158.54	2.59	2.59	1.94	1.94	1.42	87.3	65.5	65.5	48.0
VGP283, VGP293, VGP393 LED210-4S/740/740	18060	114.2	158.14	2.66	2.66	1.99	1.99	1.46	87.5	65.6	65.6	48.1
VGP283, VGP293, VGP393 LED215-4S/740/740	18275	117.2	155.93	2.73	2.73	2.04	2.04	1.50	88.7	66.6	66.6	48.8
VGP283, VGP293, VGP393 LED220-4S/740/740	18700	120.2	155.57	2.80	2.80	2.10	2.10	1.54	88.9	66.7	66.7	48.9
VGP283, VGP293, VGP393 LED225-4S/740/740	19125	123.2	155.24	2.87	2.87	2.15	2.15	1.58	89.1	66.9	66.9	49.0
VGP283, VGP293, VGP393 LED228-4S/740/740	19380	125.1	154.92	2.91	2.91	2.18	2.18	1.60	89.3	67.0	67.0	49.1
VGP283, VGP293, VGP393 LED29-4S/830/830	2581	15.7	164.39	0.37	0.37	0.27	0.27	0.20	84.2	63.1	63.1	46.3
VGP283, VGP293, VGP393 LED30-4S/830/830	2670	16.3	163.80	0.38	0.38	0.28	0.28	0.21	84.5	63.4	63.4	46.5
VGP283, VGP293, VGP393 LED35-4S/830/830	3115	19.5	159.74	0.45	0.45	0.34	0.34	0.25	86.6	65.0	65.0	47.6
VGP283, VGP293, VGP393 LED40-4S/830/830	3560	22.7	156.83	0.53	0.53	0.40	0.40	0.29	88.2	66.2	66.2	48.5
VGP283, VGP293, VGP393 LED45-4S/830/830	4005	25.8	155.23	0.60	0.60	0.45	0.45	0.33	89.1	66.9	66.9	49.0
VGP283, VGP293, VGP393 LED50-4S/830/830	4450	29.1	152.92	0.68	0.68	0.51	0.51	0.37	90.5	67.9	67.9	49.8
VGP283, VGP293, VGP393 LED55-4S/830/830	4895	32.3	151.55	0.75	0.75	0.56	0.56	0.41	91.3	68.5	68.5	50.2
VGP283, VGP293, VGP393 LED60-4S/830/830	5340	35.6	150.00	0.83	0.83	0.62	0.62	0.46	92.2	69.2	69.2	50.7
VGP283, VGP293, VGP393 LED65-4S/830/830	5785	38.9	148.71	0.90	0.90	0.68	0.68	0.50	93.0	69.8	69.8	51.2
VGP283, VGP293, VGP393 LED70-4S/830/830	6230	42.2	147.63	0.98	0.98	0.74	0.74	0.54	93.7	70.3	70.3	51.6
VGP283, VGP293, VGP393 LED75-4S/830/830	6675	44	151.70	1.02	1.02	0.77	0.77	0.56	91.2	68.4	68.4	50.2

VGP283, VGP293, VGP393 LED80-4S/830/830	7040	47.2	149.15	1.10	1.10	0.82	0.82	0.60	92.8	69.6	69.6	51.0
VGP283, VGP293, VGP393 LED85-4S/830/830	7480	50.5	148.12	1.17	1.17	0.88	0.88	0.65	93.4	70.1	70.1	51.4
VGP283, VGP293, VGP393 LED90-4S/830/830	7920	53.8	147.21	1.25	1.25	0.94	0.94	0.69	94.0	70.5	70.5	51.7
VGP283, VGP293, VGP393 LED95-4S/830/830	8360	57.1	146.41	1.33	1.33	1.00	1.00	0.73	94.5	70.9	70.9	52.0
VGP283, VGP293, VGP393 LED100-4S/830/830	8800	60.4	145.70	1.40	1.40	1.05	1.05	0.77	95.0	71.2	71.2	52.2
VGP283, VGP293, VGP393 LED105-4S/830/830	9135	63.8	143.18	1.48	1.48	1.11	1.11	0.82	96.6	72.5	72.5	53.2
VGP283, VGP293, VGP393 LED110-4S/830/830	9570	67.1	142.62	1.56	1.56	1.17	1.17	0.86	97.0	72.8	72.8	53.4
VGP283, VGP293, VGP393 LED115-4S/830/830	10005	70.5	141.91	1.64	1.64	1.23	1.23	0.90	97.5	73.1	73.1	53.6
VGP283, VGP293, VGP393 LED120-4S/830/830	10440	71.9	145.20	1.67	1.67	1.25	1.25	0.92	95.3	71.5	71.5	52.4
VGP283, VGP293, VGP393 LED125-4S/830/830	10875	75.2	144.61	1.75	1.75	1.31	1.31	0.96	95.7	71.8	71.8	52.6
VGP283, VGP293, VGP393 LED130-4S/830/830	11180	78.5	142.42	1.83	1.83	1.37	1.37	1.00	97.2	72.9	72.9	53.4
VGP283, VGP293, VGP393 LED135-4S/830/830	11610	81.8	141.93	1.90	1.90	1.43	1.43	1.05	97.5	73.1	73.1	53.6
VGP283, VGP293, VGP393 LED140-4S/830/830	12040	85.2	141.31	1.98	1.98	1.49	1.49	1.09	97.9	73.4	73.4	53.9
VGP283, VGP293, VGP393 LED145-4S/830/830	12470	88.5	140.90	2.06	2.06	1.54	1.54	1.13	98.2	73.7	73.7	54.0
VGP283, VGP293, VGP393 LED150-4S/830/830	12750	91.9	138.74	2.14	2.14	1.60	1.60	1.18	99.7	74.8	74.8	54.9
VGP283, VGP293, VGP393 LED155-4S/830/830	13175	95.3	138.25	2.22	2.22	1.66	1.66	1.22	100.1	75.1	75.1	55.0
VGP283, VGP293, VGP393 LED160-4S/830/830	13600	98.7	137.79	2.30	2.30	1.72	1.72	1.26	100.4	75.3	75.3	55.2
VGP283, VGP293, VGP393 LED165-4S/830/830	14025	102.2	137.23	2.38	2.38	1.78	1.78	1.31	100.8	75.6	75.6	55.5
VGP283, VGP293, VGP393 LED170-4S/830/830	14280	105.6	135.23	2.46	2.46	1.84	1.84	1.35	102.3	76.7	76.7	56.3
VGP283, VGP293, VGP393 LED175-4S/830/830	14700	109.1	134.74	2.54	2.54	1.90	1.90	1.40	102.7	77.0	77.0	56.5
VGP283, VGP293, VGP393 LED180-4S/830/830	15120	112.5	134.40	2.62	2.62	1.96	1.96	1.44	103.0	77.2	77.2	56.6
VGP283, VGP293, VGP393 LED185-4S/830/830	15540	116	133.97	2.70	2.70	2.02	2.02	1.48	103.3	77.5	77.5	56.8
VGP283, VGP293, VGP393 LED190-4S/830/830	15770	119.6	131.86	2.78	2.78	2.09	2.09	1.53	104.9	78.7	78.7	57.7
VGP283, VGP293, VGP393 LED195-4S/830/830	16185	123.1	131.48	2.86	2.86	2.15	2.15	1.57	105.2	78.9	78.9	57.9
VGP283, VGP293, VGP393 LED200-4S/830/830	16600	126.7	131.02	2.95	2.95	2.21	2.21	1.62	105.6	79.2	79.2	58.1
VGP283, VGP293, VGP393 LED205-4S/830/830	17015	130.2	130.68	3.03	3.03	2.27	2.27	1.67	105.9	79.4	79.4	58.2
VGP283, VGP293, VGP393 LED210-4S/830/830	17220	133.8	128.70	3.11	3.11	2.33	2.33	1.71	107.5	80.6	80.6	59.1
VGP283, VGP293, VGP393 LED215-4S/830/830	17630	137.4	128.31	3.20	3.20	2.40	2.40	1.76	107.8	80.9	80.9	59.3
VGP283, VGP293, VGP393 LED220-4S/830/830	18040	141.1	127.85	3.28	3.28	2.46	2.46	1.80	108.2	81.2	81.2	59.5

** Note that if the product is non-dimmable, only the values for "NC (No Control)" are valid; if the driver type is PSU, only the values for "NC (No Control)"and "PS (presence sensing)" for are valid.*